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The basics of building surveying can seem more complex when we try to standardise and promote our practice, finds Alex Charlesworth

The what and the how

It strikes me that at the core of all the services we provide as surveyors is our ability to strip a building down mentally into its component parts, and this edition of Building Surveying Journal focuses on that ability: building pathology.

This is a skill of which we can be proud, and one that is often used to describe what we do. As though a detective, a building surveyor will get under the skin of the building through physical inspection, analysis of documentation and good old-fashioned police work.

That is what we do; but it is how we do it that often causes debate. How should a building be inspected? From the outside in, or the inside out? From top to bottom or vice versa?

There is no consensus, though – everyone has good reasons to inspect in their own way. I personally like to inspect the outside first, briefly, to gain a sense of perspective, look for obvious defects, and build up a mental impression of the building. Then I like to inspect the roof and move from top to bottom inside, I finish with the externals in more detail, and then pinpoint any issues that require further analysis.

Clearly, this routine must be flexible and work around the occupier’s requirements, the weather, access hoist timings and the amount of daylight available. I’d welcome your views and the rationale behind your own inspection routines: answers and opinions on our LinkedIn page, please.

Standards

RICS is looking at restructuring in the short term, with the aim of focusing more on international standards (see pp.18–19) and engaging more closely with its professional membership. Although the detail has not yet been cemented, there will be a consultation period that will ensure that feedback can be taken into account before any major changes are made.

As part of this focus, all professional group boards have already been rewriting guidance notes on a priority basis. Some of these will now be known as professional statements, which will include sections that are mandatory as well as best practice and guidance. Where possible, such statements will be designed to apply on an international basis.

I have been involved in rewriting the Building surveys and technical due diligence of commercial property guidance note, 4th edition, as a Technical due diligence professional statement, and this has thrown up some interesting issues.

Historically the UK, Europe, Oceania and other world regions have all had versions of the guidance note, which were broadly similar but far from consistent. These have been collated into the professional statement by taking the best from each, and clearly consultation will now be needed to ensure respective professional boards across the globe adopt the new document.

Trying to make aspects of the statement mandatory has also been difficult. Using words such as “shall” and “will” instead of “may” and “should” could potentially open surveyors up to legal claims where aspects of the service they have provided have not been undertaken exactly as described.

Therefore, the terminology used will also go before the scrutiny of lawyers.

International professional statements will nevertheless provide a clear, identifiable standard that defines how surveyors must behave and act when undertaking the relevant service, and clients will know that these will be regulated by RICS. It is all about raising the bar across our profession, to the benefit of surveyors and clients alike.

Marketing

As part of the changes and restructuring of RICS, promoting our profession will be given more priority. The Building Surveying Professional Group Board is working with RICS for instance to revise the Building Surveying website pages and offer articles that reflect a good cross-section of the diverse services we provide, which can then be promoted through social media.

Electronic booklets for schools, universities and clients will also enable our profession to promote what we do. Case studies and personal profiles of building surveyors will be added to the website, demonstrating where we add value as well as presenting some of the more exciting projects on which we have worked.

A short film encompassing all of the above is another project the board is pursuing, though funding issues may make this a longer-term endeavour. The essence of the film will be to portray what we do as a profession, and where we add value. While this project is still in its infancy, we would do well to remember that building pathology remains the core of our profession.
Light loads

Installing solar panels on roofs is not without its risks, warns Trevor Rushton

Notwithstanding the significant drop in feed-in tariffs announced by the UK government in April 2016 – which pay the owners of on-site generation plant for the power they feed into the grid – the market for solar photovoltaic (PV) panels remains competitive.

As global production of solar PV has grown, the cost of the cells and panels has fallen dramatically, while improvements in technology and electricity storage have helped the industry develop profitable models that require little or no subsidy.

According to the Solar Trade Association, there are now more than 1m homes in the UK with PV and solar thermal panels installed – representing 4% of all homes – most of which have had panels retrofitted.

Roof risks

Needless to say, fitting panels to a roof can pose risks, and we are beginning to see an increasing number of errors arising from less than perfect design and quality of work. Problems are not confined to retrofitting existing buildings: new products are continually being introduced, while poor installation of building-integrated systems by individuals who are not familiar with them can result in unsatisfactory performance – wind uplift and leakage being two examples.

Following several reports of damage to buildings arising from inadequate supports, overloading of the structure, impaired waterproofing and wind damage, the body Structural-Safety has released an alert, PV Installations: structural aspects (http://bit.ly/2heU8g). This makes a number of recommendations, including the following:

- a structural appraisal should be carried out by a competent person, with proper checks of both the upper and lower surfaces of a roof after installation
- particular care is needed in areas likely to experience high wind and snow
- an adequate number and type of fixings must be used – usually at every truss leg as a minimum.

Structural-Safety points out that, in addition to the dead weight of the panels, their installation can also lead to problems of snow loading, depending on the type of panel, and wind uplift. As a roof normally works in structural terms by sharing loads over several interacting elements, the provision of panels can result in localised overstressing. Some risks are obvious: fitting panels over a roof covering that may be on its last legs is unlikely to be a sensible move, but installation on newer coverings can also lead to difficulties.

My firm, Watts, recently reported on a significant claim arising from water penetration of a single-ply membrane roof. In this case (see image, above), the installer had used secondary fixing screws to secure plastic trays between the retrofitted panels; the screws were very slightly longer than the manufacturer had specified, so when the trays were loaded they penetrated the roof covering in dozens of places. In another case, the reversal of plastic transition tiles resulted in problems of wind uplift between the panels and the adjoining pitched roof.

BRE research

BRE has been conducting research into a number of firefighting issues, and while one might think PV panels present little or no risk, this is not so: firefighters are having to adapt their methods to deal with risks otherwise unfamiliar to them.

It is usually fairly easy to shut off AC power in a building in the event of an emergency. However, PV panels will always be live while light is shining; they can generate potentially high DC voltages that can be more dangerous than AC.

A large array could generate around 1,000V DC, leading to a risk of electric shock in the event of a fire damaging a cable and allowing parts of an exposed conductor to touch a steel frame.

Furthermore, the increased roof loads could cause the premature collapse of a fire-damaged structure, while panels could melt, resulting in the release of toxic heavy metals.

According to BRE, some firefighters have reported difficulties in dealing with roof fires as PV panels act as an umbrella to the firefighting water jet, preventing access to the roof structure and resulting in more extensive damage or collapse.

It takes time for users and advisors to appreciate the emerging risks associated with new products. Building surveyors need to be alive to the potential for seemingly harmless technology to cause problems, and to recognise that sometimes things are not as simple as one might believe.

Related competencies include Building pathology, Construction technology and environmental services

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Nothing lasts forever

Michael Parrett considers how building defects contribute to damp problems

Defects and failures occur through natural deterioration, lack of maintenance, architectural design and poor construction. Difficulty arises, though, when internal dampness and mould develop and investigators often struggle to make the vital connections between the principal factors.

For example, in social housing, emphasis has been placed on problems being caused by occupants’ lifestyles. In my opinion, based on thousands of investigations, it would be a mistake for practitioners to make this assumption without eliminating the other elements affecting the building; the approach must be holistic.

Natural deterioration

All materials have a life expectancy. Even something as durable as natural Welsh slate, which took millions of years to form,

1 Roof spread on a typical 1920s cottage where the original slate-tiled roof was replaced with interlocking concrete tiles with a much higher implied weight loading on to the frame. The timber collars had not been strengthened with additional bolts to the rafters. Warning signs include separation of the soffit boards from the wall face, curvature of the cast-iron guttering and outward movement of the top of the brick walls.

2 Perforation of steel-barrel underground water main supply pipes. Galvanised (zinc-coated) steel pipes laid into soil will eventually corrode and lead to water escaping. These pipes were excavated from the ground at an 85-year-old property. Zinc is a sacrificial anode and will deteriorate in most soils, especially ones with higher acidity. This results in the steel gradually losing its protection, leading to corrosion and eventual perforation of the buried, bare steel pipes.
will eventually delaminate and crack; this is through natural deterioration caused by exposure to water, algae, frost and so on. Hard Portland cements used for wall renders will also deteriorate over time because they are unforgiving when buildings naturally move. Cracks will allow water to enter, and so starts the degradation cycle of frost action.

Another example is lime used on walls. In Venice, lime is partly used to encourage salt to come out of the brickwork because of the high incidence of rising damp. But the salt naturally breaks down the lime, and the walls have to be re-limed at least every 15–20 years.

Underground lead water mains meanwhile have a proven life of around 100 years, after which they become brittle and the slightest movement will cause them to perforate or fracture, particularly if they are laid in acidic or aggressive soils. Natural deterioration also happens with underground steel pipes for gas and water mains. Some are galvanised and use zinc as a sacrificial anode that will deteriorate; a similar process is used on old steel-frame windows. In both cases, the zinc breaks down and exposes the unprotected steel beneath, which then rapidly corrodes.

Other examples of natural forces causing deterioration include:
- ground movements – both subsidence and heave – cracking slate damp-proof courses and disturbing gas, water mains and drainage
- sulphates permeating through a rising water table causing solid floors to crack, craze and delaminate, in particular in older buildings
- carbonation of concrete, when carbon dioxide slowly penetrates the surface and mixes with moisture trapped in the pores, reacting with calcium hydroxide to form calcium carbonate that causes the deterioration of the concrete and the steel reinforcements inside
- chloride attack on concrete, for example, caused by salt being spread on road bridges, which leads to severe breakdown of the concrete
- low bitumen content undersarking will erode, especially where it is lapped into the gutter. Water then runs down the back, rotting fascia and soffit boards, and perhaps also runs into the walls or the top of window heads as well, leading to further deterioration.

**Assisted deterioration**

Human intervention can exacerbate deterioration and is often linked to poor maintenance routines, for instance, where

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**Case study**

A four-storey flat conversion in south London suffered from many different issues: poor design and construction, natural and assisted deterioration, and lack of maintenance all combined to create serious problems in the property.

The owners had partially extended the rear ground floor and installed a mono-pitch roof. Unfortunately, this prevented easy access to the eaves gutters of the main roof and impeded routine maintenance, such as painting the cast-iron gutters. The gutters also filled with leaf litter and moss balls that had formed on the north-facing main roof. This had been replaced some years earlier but now suffered from erosion of the low-bitumen content undersarking, which further deteriorated in the eaves gutter.

The result was that rainwater spilled over the gutters and penetrated the solid wall where timber-floor joists anchored into the wall between floors. These joists then started to decay. An under-sink pipe also leaked because of poor maintenance and a blocked bathroom extractor fan did not remove the moisture.

These issues together conspired to create a massive outbreak of the dry-rot fungus *Serpula lacrymans*. Because this growth had prevailed over time, the fungus produced the ‘fruiting’ body from which extended the *mycelium hyphae* and its characteristically cobweb-like strands. These eventually weakened the timber joists to the point where their collapse was a possibility.

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**The building surveying profession needs a Hippocratic oath that recognises the limitations of most general or structural surveys**

The signs of dampness caused by extreme cases the roof can collapse. The signs of dampness caused by poor construction often exacerbates deterioration and increases the chance of building failures. Take the example of a slate roof that has naturally deteriorated and needs renewing. Slate roofs should normally be replaced with a similar natural or simulated material, but interlocking concrete tiles are often used and these place a much higher loading on to a timber-framed roof, so additional strengthening works are needed.

We have found cases where this has not happened and even instances where some collars, struts and purlins have been removed, or the collars are merely nailed rather than bolted to the rafters. These issues lead to roof spread that pushes out the tops of the external walls, distorting soffits and fascia boards and even bending cast-iron gutters. In extreme cases the roof can collapse.

**Identifying the cause**

The signs of dampness caused by a building defect are similar to other causes. There may be staining on walls, that require lime-wash finish, which trap moisture rather than letting walls breathe

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**Notes**

- Use of most chemical damp-proof injections, which do not provide a complete barrier to prevent rising damp in masonry and other walls.
- The Society for the Protection of Ancient Buildings promotes the annual National Maintenance Week and National Gutters Day to help raise the profile of preventative maintenance.
- Poor construction often exacerbates deterioration and increases the chance of building failures. Take the example of a slate roof that has naturally deteriorated and needs renewing. Slate roofs should normally be replaced with a similar natural or simulated material, but interlocking concrete tiles are often used and these place a much higher loading on to a timber-framed roof, so additional strengthening works are needed.
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1. Hippocratic oath
2. Case study
3. Building surveying profession
4. Assisted deterioration
5. Natural and assisted deterioration
6. Poor design and construction
7. Lack of maintenance
8. slate roof
9. Interlocking concrete tiles
10. Damp-proof injections
mould, high meter readings and so on. Many defects happen at roof level with water penetrating downwards throughout a building.

Indications of building failures can be obvious, such as cracked or dislodged roof tiles and leaking pipes. Or they may be more subtle, such as the slight outward movement of walls, distortion of fascias or the curvature of guttering.

These signs should be easy to see in houses, but may be more difficult to identify on a much taller building where it is harder to check clearly whether guttering is an older cast-iron system or a modern replacement, for example. Good binoculars or a telephoto lens on a camera should help you identify detail.

Defective rainwater goods are the most common failure that cause damp penetration, often leading to a misdiagnosis of rising damp when water from an overspilling gutter strikes the ground and splashes onto the base of the wall.

While it may sound simplistic to talk about issues such as gutters, these problems bedevil everyone from surveyors to social landlords. I have been called to many properties where it has turned out to be routine gutter and rainwater pipe sale. However, in multiple-occupancy buildings other people might give clues to help diagnose potential problems. A chat with someone else – such as another tenant, neighbour, management committee member or the person in charge of maintenance – might reveal a lot more about the history of a building and any maintenance issues.

It is easy for a surveyor to miss or misdiagnose a building defect. This is mainly because surveys are usually conducted on a single visit and often do not include any measurement, invasive testing or detailed investigation. In such a short timescale, it can therefore be difficult to determine the cause of an issue correctly, so surveyors invoke caveat emptor (“let the buyer beware”).

Some causes and problems are clearly connected, such as a leaking external rainwater pipe and a corresponding internal damp stain. But what happens when the link is not clear, or there may be more than one cause? What if the actual cause is a leaking water main, a missing damp-proof membrane, or some other problem that is invisible from a brief inspection?

A surveyor might use their professional judgement about the likely cause, but...
this will require further examination and testing to be certain. More in-depth pathology is required, which will usually mean some degree of invasive investigation.

This might feel like a step into the unknown on a residential survey, and goes against general guidance that promotes non-intrusive, non-destructive approaches. I have often found that the best way to determine the cause and source of a problem is through some kind of invasive testing, such as an optical endoscope. In many cases, further and better pathology should be suggested to the client to make them aware of what is required, rather than a referral to damp ‘specialists’ offering long-term guarantees.

Construction supervision

Insufficient supervision of construction contributes to building defects; it can be easy for the quality on projects to slip and this increases the risk of failures. Poor design can lead to many failures, including damp caused by leaking soil vent pipes and buildings that do not comply with fire regulations.

An example of poor building control processes relates to airtightness. A building was nearing completion and a standard air pressurisation test was conducted. It found that the building leaked like a colander. When the head of building control was asked about inspections, he said his department had never been invited to visit the site.

In my opinion, the building control service needs to be strengthened to meet the challenge of an increased number of construction projects during stronger economic cycles. This can only be done by engaging more trained inspectors to cope with the demands and complexities of making buildings sustainable, airtight and energy efficient.

Maintenance data

When budgets are tight, maintenance cycles are often stretched and cause building elements to fail, when more regular intervention would have prevented such damage. It is important that those responsible for maintaining property portfolios, such as social landlords, build accurate databases recording when different measures were applied to various elements of buildings. The system should include reminders of when a previous repair or renewal measure is approaching its anniversary, so its condition can be reassessed and a decision made about whether renewal is required. It should also drive and record the mid-life maintenance regimes of solutions, as these will help prolong their working life.

For example, flat roofs with elastomeric mineral felt systems only have an insured life of 20–25 years, but many may not even last that long. A protected underground steel water main may last 50–80 years, but an unprotected one may perforate in eight to 10 years. It is important that somebody understands this lifecycle information because it will allow them to make proactive and informed decisions about maintenance work.

Lifecycle work

While ensuring high-quality construction for a building is crucial to its future performance, preventative maintenance is probably the most important way to avert ongoing building failure. So when you next perform a survey, what questions are you going to ask about work that has or should have been done?

The building surveying profession needs an equivalent of doctors’ Hippocratic oath, one that recognises the limitations of most general or home surveys. It needs to develop a new generation of forensic building pathologists who can independently determine the source and cause of a building defect, especially when it relates to dampness. These pathologists will be able to write a specification of remedial works, or at least be more prescriptive about the exact remediation, further investigation or monitoring that may be required.

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Related competencies include
Building pathology, Design and specification, Housing maintenance, repair and improvements, Inspection
Some cracks can look significant, leading to assumptions about the state of the foundations, but then ultimately prove to be nothing more than a decorative issue; others can appear quite harmless, but develop over time to become a major, costly problem for the owner.

This can make the job of a surveyor tricky, particularly when they are asked to assess a crack from a single visit – say, as part of a building survey. Combined with concerns over complaints and insurance claims, this might lead some to pass the assessment of the problem on to someone else, but they need not do so.

Any good surveyor should at least be able to determine whether what they are seeing is a structural issue or just a cosmetic problem. Most should also be able to offer their client some advice on the probable causes and remedies.

**Severity of cracks**

The first step is to consider the severity of the cracks, and BRE Digest 251: Assessment of damage in low-rise buildings provides a good starting point.

Following a study of 130 properties suffering from subsidence, five kinds of crack were identified, categorised primarily by width. In simple terms, the study found that categories 1 and 2, cracks of less than 5mm, were essentially aesthetic problems only and unlikely to indicate a significant structural issue. Cracks in categories 3 and 4, of between 5mm and 25mm, were found to cause serviceability issues, such as sticking doors or penetrating damp. Anything in category 5, being more than 25mm, was considered to require structural intervention (http://bit.ly/2eXqHnJ).

This is a simplified approach only, however, and other factors should be considered, such as the number of cracks. For example, several 3mm cracks may only cause a serviceability issue whereas a lot of 1.5mm cracks could indicate a problem with the structure. Categorisation is, however, a good place to begin.

Once the surveyor is sure there is a problem, they should consider what the cause may be. There are many different forms of structural issue, but a few are more common than others.

**Lateral restraint**

One common cause of cracks in solid walls is where the force of the roof pushing out at the top is not offset by beams at floor and ceiling level applying force to pull the walls back together; this is known as lateral restraint. The balance of forces in such cases holds the wall in a vertical position, but it depends on those forces being equal.

Where the wall loses its mechanical connection to the floor joists, normally as a result of rot, it can start to pull away, leaving a noticeable bulge in the outside wall. This is easier to see when the masonry has been left exposed, but when a property is rendered it can sometimes be mistaken for bulges caused by blown render. Instances of lateral restraint, as opposed to blown and bulging render, will also normally be accompanied by excessive movement or spring to nearby floors.

A surveyor is more likely to come across this problem when a roof covering is changed from something lightweight, such as slate, to something much heavier. The common example is when heavy concrete tiles are used on a late Victorian terrace’s roof, which would originally been covered with slates: the increased load causes the top of the walls to be pushed out, and because masonry walls do not have much flexibility, horizontal cracks will appear just a few courses down from the eaves.

**Cavity wall-tie failure**

The outer skin of a cavity wall has almost no structural stability, being too slender to support its height. Instead, it relies on the support of the internal wall to hold it upright. To connect the two walls but maintain a suitable cavity, a wall tie is used. In modern buildings, these are normally stainless steel and generally pose no problems, provided they are installed correctly. However, when they first came in to use – around 1910, or a little earlier in some regions – it was more common to use iron.

In many ways iron was suitable for the job, but it does tend to rust and when it does it not only loses strength but also expands. As the wall ties are bedded in to the mortar between the bricks, the expansion forces the courses apart and creates regularly spaced cracks through the mortar matching the tie’s locations. This is a good example of several category 2 cracks indicating something more than a decorative issue. Bear in mind that wall ties can also fail for other reasons without causing cracks to the outside walls, and this can only be seen by inspection inside the cavity.

**Failing lintels**

Most windows and doors are not structural so will need a lintel to take the load of the structure above and distribute it to the surrounding walls – a simple idea that has been a part of construction since people decided that caves were not the most desirable form of property.
Although lintels have been around for a long time, mistakes are often made. One such mistake is where a lintel does not have enough bearing; that is, it may not be extended far enough into the surrounding wall. When this happens, one end of the lintel can often slip where the pressure of the wall above causes a diagonal crack through that wall.

Usually the lintel will stop in a secure position and the cracking will be minor, in category 1 or 2. More severe movement and cracking – category 3 or 4 – can result in sticking doors or windows and repairs will be required.

Even where any movement of the lintel has stopped and is secure, it can still be a problem if the windows beneath are replaced. The older window may have been providing a degree of support, and as soon as it is removed the wall above could collapse. For this reason, it is important to make a client aware of even historic movement of lintels, particularly if the windows are older or in a degraded state.

Where there is any doubt about whether the movement may be ongoing due to insufficient bearing then remedial repairs are required.

Subsidence caused by trees
Subsidence is often treated as being separate from structural movement, and rightly so. Structural issues develop due to defects in the building, while subsidence is caused by problems with the ground under the building. This is an important distinction because standard building insurance policies will cover subsidence but not repairs related to building defects.

The most common cause of subsidence that a surveyor will see is that caused by trees, which disturb the ground by drawing up water (see article on p.13 of this issue). Even small trees can take a significant volume of water from the ground, while a large deciduous tree can need 50,000 litres per year and in drought conditions can have an effect down to a depth of 6m.

When dry ground shrinks, particularly where it is largely clay, any foundation sitting on it will also move and if the shrinkage only happens under part of a building then cracks will appear. These are normally tapered, visible both inside and outside the property and extending below the damp-proof course; but any cracking to a building that is likely to be over the root system of a large tree should give cause for concern.

As a rule of thumb, a root system is usually of the same diameter as a tree's crown. As with most rules of thumb there are exceptions; for example, the safe distance for a willow tree is 40m, much greater than the usual crown width.

Just because a tree's roots may be growing under a building, it does not necessarily mean that they should be removed as this can often cause its own problems. If a tree is not there to take up the water, then the ground expands and will start to push against a building, which is referred to as ground heave.

Inspection and investigation
Although all the above issues will need further investigation to diagnose properly, it does not mean that a surveyor cannot provide meaningful advice to a client from just a one-off, non-invasive inspection.
Darren Coppins explains how computers can be used to model thermal junctions and diagnose damp

Testing the water

The use of thermal imaging can provide valuable information for the diagnosis of condensation, which can often be associated with poor thermal bridging or, where older buildings are concerned, the omission of insulation.

Insulating the existing fabric of a building, either internally or externally, can worsen the situation if material is not correctly applied. For instance, insulation can potentially cause interstitial condensation in fabric junctions, resulting in the undetected degradation of the fabric or structural elements in a wall.

Computer simulation

Junctions can be digitally simulated by using data from thermal imaging and knowledge of the building’s original structure, which in turn enables diagnosis of the initial problem and evaluation of potential solutions. This evaluation is undertaken with finite element mesh analysis, a method more commonly used to evaluate bridging for Standard Assessment Procedure calculations, and this usually results in significant passive measures that reduce fabric heat loss.

Today, a number of different software tools are available for such analysis. The junction or thermal bridge detail that requires study is modelled in two or three dimensions, depending on the heat flow and the junction’s complexity.

The software then generates a mesh, splitting the detail into many individual cells. Equations relating to the flow of heat from cell to cell can then be solved in a process that is repeated iteratively by the computer until a thermally balanced solution is found.

The result provides temperature information across the junction, showing where the heat flows through the fabric (see Figure 1). From this information, condensation risk can be calculated for a range of internal humidity conditions, including poorly ventilated spaces and areas with high moisture gain such as bathrooms and kitchens.

The junction can also be dynamically simulated by changing internal and external conditions each side of the fabric. This permits the thermal mass of the fabric and the associated delay in materials’ reaction to temperature change to be considered.

Such calculations can be used to evaluate how elements with a high thermal mass react when externally insulating a masonry wall. In a steady-state snapshot, the problem may seem to have been eliminated, yet in an occasional or very intermittent heating scenario, a material of high thermal mass that is in contact with the internal environment can still result in condensation because the material is slow to warm up compared to the surrounding air. Such scenarios are few and far between, but they highlight the need to consider usage patterns.

Application example

An existing social housing development was suffering from internal condensation and mould growth on the junction between an external first floor and wall. Thermal imaging identified that the problem was caused by low surface temperature resulting in surface condensation, and not by fabric degradation causing water ingress.

The construction was modelled using PsiTHERM software and existing conditions replicated. In total, five separate junction types were identified and, through the computational analysis, it was proved that condensation would occur in all of them during the winter. This accorded with conditions seen on site.

Several insulation options were examined, including cavity fill and external applications. The software demonstrated that external insulation of 30mm with a thermal conductivity of 0.025W/mK would be required to resolve the risk of condensation fully due to the nature of the thermal bridge.

With combined use of thermal imaging and computational modelling of heat flow through building junctions and thermal bridges, a robust solution to an ongoing problem was found and replicated in the model before being implemented.

Challenges

The quality of the calculation results depends on the quality of the input to the model. At the time of publication, there is no accreditation course available for the calculation of fabric heat transfer using this method, other than the training that software houses provide in the use of their own tools. Self-accreditation can be undertaken, however, whereby an individual can prove their own competence by matching a set of sample calculations provided by the BRE.

U-value, thermal bridge and surface condensation calculations and analysis are generally covered by BS EN ISO 8990, BS EN ISO 12567: 1 and 2 and BRE publications BR443, BR497 and IP1/06.

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Branching out

Vivien King considers some cases concerning damage caused by trees

Obtaining a property that contains high alumina cement, sea-dredged aggregates or, in Cornwall, mundic (iron pyrite) blocks will set alarm bells ringing, and the presence of substances such as asbestos should also lead to further inquiries. But what about a property that contains trees? Trees, beautiful as they are, can be a nuisance, and have over the years led to numerous court actions.

Highway hazard

For instance, in the case of Delaware Mansions Ltd and others v Westminster City Council [2001] 44 EG 150, the House of Lords considered trees along a highway, for which the local authority was responsible and whose roots were encroaching on a nearby property, causing damage. The claimant, who purchased its property interest after the damage was inflicted, conducted necessary remedial works. The council had refused to remove the trees, and was held liable for the damage in the form of a private nuisance.

In Chapman v Barking and Dagenham London Borough Council [1997] 2 EGLR 141, a falling tree branch caused injury to a person using the highway. The tree-owning council had previously had pruning works carried out to the tree but failed to inspect again at any later date, when inspection would have revealed the tree was a potential hazard. Recognising the heavy commitment the court was placing on local authorities in respect of trees along the highway, the judge nevertheless found that a nuisance had been proven.

It was possibly because of the need to inspect and act highlighted by Chapman that Sheffield City Council resolved to have trees in its jurisdiction felled – a resolution that local people sought to be reviewed by the courts in The Queen (on the application of David Dillner) v Sheffield City Council and another [2016] EWHC 945 (Admin). Giving a lengthy and detailed judgment, Mr Justice Gilbart held that the council had statutory duties with regard to the upkeep of its highways and had acted properly in ordering the removal of trees. He refused the application for an injunction to protect the trees and for judicial review of the council’s resolution.

Do others, too, have a duty to inspect their trees and to act in light of a potential hazard? In Quinn v Scott [1965] 1 WLR 1004, decay of a tree was “there to be seen” and its owner, the National Trust, should have had it felled. The court held that: “The duty of the Trust is to take such care as a reasonable landowner – and that means a prudent landowner – would take to prevent unnecessary danger to users of the highway adjoining the Trust’s land.

“There is not to be imputed in the ordinary landowner the knowledge possessed by the skilled expert in forestry ... But, in my opinion, there may be circumstances in which it is incumbent on a landowner to call in somebody skilled in forestry to advise ... and I have no doubt that a landowner on whose land this belt of trees stood, adjoining a busy highway, was under a duty to provide himself with skilled advice about the safety of the trees”.

Damage to trains

In Stagecoach South Western Trains v Kathleen Hind and another [2014] EWHC 1891 (TCC), an ash tree in private ownership fell on a railway line causing damage to a train. The train company sought damages from not only the tree owner, Ms Hind, but a tree surgeon whom she had instructed. Giving an extensive and interesting review of the law relating to liability for one’s trees, the judge concluded: “I find that Ms Hind’s duty extended no further than the carrying out of periodic informal or preliminary observations/inspections of the Tree. I find that she was capable of performing that duty and that she complied with that duty.

“There was nothing that should have alerted her, or put her on notice, that the tree was anything other than healthy, or required a closer inspection by an arboriculturalist.

The claim in tort against her therefore fails.” He further held the tree surgeon had a duty of care to Ms Hind, a duty he had not breached and which did not extend to a third party.

So, if you or your clients have trees in the vicinity of a boundary and in particular a boundary marked by a highway or other right of way, do inspect them and, if in any doubt about safety, take expert advice.

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Related competencies include
Legal/regulatory compliance
Inspection misconception

Tony Defries clarifies what compliance with the Building Regulations means – and the consequences of overlooking your responsibilities

There seems to be a general misconception that possession of a Building Regulations Completion Certificate confirms that works are compliant. This is often not so.

While building control is important, it is not a quality assurance process that identifies and remedies all deficiencies. The certificate simply confirms that the approved inspector or building control officer has, using reasonable skill and care, inspected the building and as far as they are reasonably able certified that the works comply with the regulations.

Unlimited fines

Holding a certificate does not put the responsible party beyond the regulations’ reach. If non-compliant features are found after the works are completed, the local authority has a duty to enforce the regulations under section 35 and 35A of the Building Act 1984 for up to two years. When no corrective action is taken, it is able to seek unlimited fines.

If the works have not been completed in line with the regulations but certified complete and compliant, the local authority can take the following steps.

- For the first 12 months, it may serve an enforcement notice on the contractor and take legal action. In the first instance, this is usually done informally against the main contractor, but litigation may be pursued if necessary.
- From the end of the first year up the end of the second, if the owner does not comply with the notice then the authority can undertake the work itself and recover all reasonable costs.
- Once two years have elapsed since completion, the non-compliances are deemed unenforceable under the regulations. Deficiencies then need to be considered under different legislation, such as the Regulatory Reform Fire Safety Order 2005, health and safety legislation including the Health and Safety at Work etc. Act 1974, the Workplace Regulations, and legislation on houses.

Who is responsible?

The responsibility to verify that the design and construction accords with the Building Regulations remains with the designers, material suppliers, main contractor and subcontractors. How it is actually apportioned depends on the form of contract and appointment documentation. However, the responsible parties still tend rely on the officer or inspector to identify non-compliance issues but then fail to fulfil their function adequately by ensuring compliance.

Non-compliance with the Building Regulations can have significant health and safety implications for building users and the cost of remedial works can be significant, potentially causing material delays to the sale or letting of a building.

Case law since Anns v Merton London Borough Council [1978] substantially exonerates the officer or inspector of liability, and has been tested more recently in the European Court of Human Rights. However, the failure of the responsible consultants and contractors to fulfil their duties exposes them to the risk of claims of negligence.

From my recent work, clear examples of non-compliance include the following:

- Sealant in plasterboard and unsealed holes in fire-rated walls (see image 1)
- Unfixed fire-rated collar around soil pipe, not sealed to wall (see image 2)
- Missing fire stopping to movement joints between a car park and flats above to maintain two-hour fire compartment
- Missing and incomplete fire protection to fire-rated service risers and partitions in offices and student accommodation to plasterboard construction
- Incorrect use of intumescent acrylic foam to joint sealant in plasterboard and around pipework in fire-rated shafts and partitions; most intumescent foam has only been tested in solid masonry or concrete walls and not other forms of construction, which has the potential to become a significant problem
- Incorrectly installed fire collars to pipework penetrations through fire-rated shafts or service risers in student accommodation and offices – use of fire-rated collars is often not understood during installation
- Inadequate end bearing of long-span steel beams on to concrete pad stone, contrary to structural engineer’s design.

To summarise, we must ourselves ask whether the buildings we are inspecting comply with the regulations and not rely on others to do so. Neither should we accept that a building is compliant simply because of a completion certificate.

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Related competencies include Design and specification, Legal/regulatory compliance
When I joined my new company in April 2015 they did not have access to BCIS. For a couple of months I had to manage without access which made it very difficult accessing cost data. Now, having a subscription to BCIS gives me easy access to a large amount of building cost data, saving me valuable time. BCIS is invaluable, as it helps me provide realistic early cost advice to our customers from a widely recognised source. 

Paul Yandall, Project Manager and Quantity Surveyor, Torbay Development Agency

BCIS provides essential data to carry out early cost advice

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Infrastructure and innovation

Surveyors need to join the data revolution to support infrastructure development and foster the skills that will ensure the profession’s future, insists RICS President Amanda Clack.

During last year’s US election campaign, President Donald Trump promised an additional $1tr investment for national infrastructure over the next 10 years. His pledge reflects an issue with which many developed countries are contending: ageing infrastructure is holding back economic growth, while investing in infrastructure can enable it.

Innovation is essential, and the rapidly evolving role of data and technology gives us an opportunity both to streamline and to disrupt traditional ways of providing the infrastructure that our world requires.

Why infrastructure matters
Resilient and effective infrastructure is central to supporting the rapid urbanisation that is occurring around the world. It has the power to encourage social change, create jobs, support businesses, improve the environment and create a better world in which to live. All markets must see further investment in infrastructure if they are to support their regional and national economies.

Infrastructure investment requires long-range planning. Trump’s election sent major shockwaves through global markets, and, with other votes including the UK’s decision to leave the EU, helped to create geopolitical uncertainty. This year, there are further elections across Europe, including in Germany and France, the outcome of which is just as uncertain.

One way of enabling certainty for infrastructure projects is through the use of data and technology. From the time of the Romans, we have seen how infrastructure encourages innovation – their straight roads and invention of concrete allowed them, as the technological disruptors of their time, to develop an empire.

Today, data and technology are reaching a new tipping point. Technology enables more effective transfer of knowledge, while data acquisition and manipulation combine to enable predictive decision-making.

To realise the potential of data, property businesses need to be alert to the value of having a chief data officer, sometimes referred to as a chief information officer. Such staff are required to manage data effectively and make transformative business decisions; they can champion the use of data in large organisations as well as taking responsibility for its security. Someone in this role should also be in a position to advise on trends, strategy, productivity and growth.

Changing skills
There is a significant ethical dimension to using data. This information is increasingly used by organisations to manipulate your thinking by creating needs that you did not even know you had. You may not even be aware this is happening as technology becomes ever more sophisticated.

The professions are perfectly placed to help organisations to navigate these ethical challenges, because the primary duty of bodies such as RICS is to act in the public interest. But in order to do so, surveyors have to adapt. Competence is at the heart of what makes a professional, and we must adapt our skills to our changing environment.

It is clear that many traditional surveying tasks are already being automated, but the same is true for the work of all professionals. Data and technology will not make surveyors redundant, but we do need to move further along the value chain. This means offering a wider range of more strategic, value-adding and advisory services.

To meet future challenges, skills training is necessary to help surveyors thrive in an increasingly digital world.

Data analytics are already embedded in all our routes to RICS membership, and our infrastructure pathway to becoming a chartered professional is now futureproofed. By looking at the components of infrastructure, alongside project finance, building information modelling and asset management, students gain competencies that are valuable in the present and future.

Data and technology are inherently complex, and professions can help to interpret change as well as train industry for the future workplace. They can also continue to pursue their remit for working in the public interest by ensuring that data is not exploited by the strong to the detriment of the weak. This is where regulation and control by organisations such as ours come into their own.

Market confidence
In a time of seemingly continual geopolitical shocks, it is more important than ever to create confidence in the market by making authoritative and innovative use of the opportunities presented by data and technology. Many concepts for data use may seem way off being workable, but this is not the case: companies such as Pauley and Oculus are taking virtual reality by storm by accurately replicating an entire environment in virtual reality. This has wide-ranging applications for the surveying sector.

Our profession needs to be seen to be innovative and acting as a digital disruptor to maintain its continuing relevance.

Amanda Clack is RICS President

Related competencies include Data management
Additional work

Q My contractor’s programme has scheduled completion for six weeks earlier than the contract completion date. If I issue instructions for additional work that should take no more than two weeks, is the contractor entitled to an extension of time?

> Charles Blamire-Brown

If you read your contract carefully and follow the guidance in the latest draft of the Society of Construction Law (SCL) Delay and Disruption Protocol, issued for consultation in June 2016, you should not go far wrong.

In the scenario described, the contractor has built six weeks of float into its programme, by which I mean the time available for an activity in addition to its planned duration. In this case, the activities comprising the works have a planned duration that ends six weeks earlier than the completion date. The six weeks is effectively additional contingency built in to the programme: if things run as planned, it should not be needed. The float in this scenario is built in at the end of the programme, and so is sometimes referred to as ‘terminal float’.

The contractor may consider that it has built this in as a contingency for its own benefit and use as part of its freedom to plan its works. In contrast, the employer may argue that it has effectively paid for this float as part of the contract price, so should have the benefit of using it for its delay events. The question is, therefore, who owns the float.

Position under JCT

In the scenario under consideration, the additional work is likely to be a relevant event, and as such it would entitle the contractor to an extension of time (EOT). However, this is only to the extent that the effect of the relevant event is to delay completion of the works or any section beyond the completion date.

Assuming that, in this case, the contractor would have completed six weeks earlier than the planned date if it were not for this relevant event, that additional work will cause a two-week delay to the planned completion. The question is whether the terminal float can be used up by the relevant event or should be preserved for the contractor’s benefit should it face future delays.

Absent any express wording to the contrary in the contract, the position is likely to be that the float should be used up for the relevant event, and to the extent there is still some float left there is no entitlement to an EOT. The draft SCL protocol confirms that “Unless there is express provision to the contrary ... an EOT should only be granted to the extent that the Employer Delay is predicted to reduce to below zero the total float on the critical path affected by the Employer Delay to Completion”.

In our scenario, four weeks of the float remain after the relevant event, and there is therefore no entitlement to an EOT.

The Joint Contract Tribunal (JCT) neither refers to nor distinguishes between terminal or activity float. The above position is therefore equally applicable to both.

Position under NEC

Under the New Engineering Contract (NEC), the additional work is likely to be a compensation event. This will entitle the contractor to an adjustment of the completion date, to the extent that the effect of the compensation event is to delay completion of the works beyond planned completion as shown on the accepted programme.

As noted above, the additional work would cause a two-week delay to planned completion. Accordingly, under the NEC the contractor would be entitled to a commensurate adjustment to the completion date. This has the effect that terminal float is preserved for the contractor’s benefit and use, unlike the situation under the JCT.

In terms of activity float, the position under the NEC is the same as it is under the JCT; that is, the float will be used for the benefit of the project on a first come, first served basis.

Entitlement to money

The contractor should in principle be entitled to compensation for its costs even if the delay does not result in an EOT, provided that the employer is aware of the contractor’s intention to complete the works before the contract completion date and that intention is realistic and achievable.

If the contractor can show that time-related preliminaries were based on completing by the planned date, and that at the time of tendering completion by this point was realistic and achievable, they may be able to recover the time-related preliminaries for these additional two weeks.

The contractor may be entitled to extension of time insofar as the relevant event delays works beyond the completion date.
Alexander Aronsohn explains why international standards are so important throughout the property development process

Many people are confused by the term “international standards”, often seeing it as relating to anywhere other than the place where they are. It is almost as if some mysterious “international” land exists where all these standards go to live harmoniously together and do their best not to bother the inhabitants of other countries.

The outlook has worsened of late, given that voters in many countries are supporting what would previously have been seen as separatist, isolationist or at the very least nationalist policies. So what do international standards mean in the current political climate and how are they good for your business?

Perhaps it is a misnomer to refer to international standards when what we are really talking about is professionalism; after all, standards are the unique selling point of RICS when compared with other service providers. It is why clients choose RICS members rather than other professionals who may or may not be able to do a similar job.

Selecting a surveyor who is not a member of RICS is like buying an electrical item without a guarantee: alternative service providers may not adhere to the same standards of professionalism that are expected of every RICS member.

Professionalism and RICS

The importance of professionalism to RICS is seen in the following two key questions that the organisation is currently exploring.

● What are the expectations of a professional today, and how do these differ from those of the past?
● What constitutes a high standard of service, and how do we manage and meet clients’ expectations in a world where so much information is freely available?

These and many other questions need to be answered to ensure that RICS and its members remain relevant in an ever-changing society. Over the past 20 or 30 years, the world has become a smaller place – people travel more and operate with a more global outlook, and even when they are working nationally or regionally they can be affected by international factors.

Avoidable scandals

The International Ethics Standards, which RICS has helped to develop (see Property Journal November 2016, pp12-13), can both create business and often save your organisation significant amounts of money.

Consider the VW emissions scandal. According to the Financial Times, VW has had to set aside €6.5bn to fix this problem (http://on.ft.com/2gXNu50), and this figure does not even cover share or brand damage.

But if VW had been a member of the International Ethical Standards (IES) Coalition, the scandal may not have happened; all its suppliers and contractors would also have to have been members and abide by its 10 ethical principles, which include accountability, financial responsibility, integrity, standard of service and transparency.

However, having ethical standards in place is not the whole answer. Enron had a code of ethics but this was not implemented or enforced, which is what led to the company’s eventual collapse. Suppose that business ethics had played a more central role in the organisation: would that have meant Enron would still be operating today?

As a member of the IES Coalition, RICS incorporates the international standards into its own five ethical principles and regulates its members under these. The RICS code of conduct will also be incorporated into the review.

Good business sense

Chartered surveyors are highly qualified service providers, but service providers nonetheless. There are a number of other service providers operating in our markets, such as brokers – who may have significant experience but limited qualifications – as well as architects and engineers providing property valuations, but often incorrectly equating price with value.

International standards are what distinguish RICS from the competition in this regard.

RICS is involved in the following international standards:

● International Ethics Standards (IES; https://ies-coalition.org)
● International Land Measurement Standards (ILMS)
● International Construction Measurement Standards (ICMS; www.icms-coalition.org)
● International Property Measurement Standards (IPMS; www.ipmsc.org)
● International Valuation Standards (IVS; www.ivsc.org).
Enabling regeneration
The International Land Measurement Standards Coalition deals with the issue of registered and unregistered land. Hernando de Soto claimed in his book The Mystery of Capital that some $9tr of “dead capital” was locked up in land, homes and businesses belonging to poor people who did not technically own them. He argued that without deeds or titles, poor people all over the world are not able to leverage their property for profit.

In recent times this view has been seen as slight oversimplification, since even unregistered property in the favelas of South America can change hands on an informal basis. But it is true that a lot of land cannot be developed due to issues with ownership titles.

The creation of agreed International Land Measurement Standards will unlock this development potential and enable regeneration in these emerging markets. This will create multiple business opportunities and public interest, provide confidence in the system to the favela owners and allow them a foothold on the property ladder.

Even when the land has been registered and transferred to new owners who wish to develop it, developers must first carry out a cost analysis and development appraisal. Currently, construction costs can vary enormously between countries and firms, each of whom may use their own basis for calculation and in some cases include planning and professional fees.

Potential cost overruns can be extreme: the highest on record is 36,917% for the Canadian Arms Registry, which escalated from an initial estimate of CAN$2m to a final cost of CAN$946m (http://bit.ly/2gpyVGj).

All this risk and lack of transparency can discourage business, whereas the ICMS provide an internationally agreed system allowing comparison of national and international construction and development costs. This additional level of clarity will mean that firms and non-governmental organisations have greater confidence in the overall cost of the developments they are undertaking.

When the development is complete, the premises must be measured for the purposes of transactions such as lettings or sales. This process is easier said than done, as many transactions are made according to national measurement standards and many occupiers and investors operate on a local basis so external developers may not be aware of the prevailing national standard when providing their space requirements.

Furthermore, research shows that, depending on the standard used, office measurements can vary by up to 24%, residential apartments by up to 15% and houses by up to 58% across world regions. In local markets, there can be a 27% variance in the measurement of residential apartments and 10% for houses (www.rics.org/loggiaslodgings).

Fortunately, the IPMS Coalition comprises more than 80 member organisations and 300 partners, all of whom are committed to the adoption and implementation of the standards. The global adoption of IPMS will make transactions much easier for international investors and tenants and encourage further business from them.

International valuation
Finally, once the premises have been built and measured, you will need to value them, normally for reporting or accounting purposes, and to do so you will need a common basis of valuation.

RICS is a member of the International Valuation Standards Council (IVSC), which includes academic, corporate and institutional members. These standards provide agreed terms, and in some instances a methodology, for the valuation of businesses, intangible assets such as intellectual property, tangible assets such as personal property, plant and machinery, and real estate.

Meanwhile, international financial reporting standards, which are adopted by more than 120 countries as the basis for accounting, work with the IVSC to encourage business and stimulate trade. This gives investors and secured lenders the confidence that reported valuation figures are accurate.

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Visit the international standards section of the RICS website www.rics.org/intstandards

Related competencies include Conduct rules, ethics and professional practice, Measurement of land and property
Making good in Australia

John Goddard reflects on life as a British building surveyor in Australia

It is funny where you end up living. I never intended to work anywhere but England; I had grown up in Surrey, then Norfolk, where I could immerse myself in my passion for sailing dinghies and timber yachts.

I studied building surveying at Thames Polytechnic and qualified as a chartered building surveyor while working in London for Richard Ellis, then moving to Chicago with the firm. It was on my way back to London the long way round that I stopped in Sydney. My summer job in a boatyard at Sydney’s Spit lasted a carefree three months until I left to take a position at Jones Lang Wootton, now JLL, as a building surveyor. I was project manager on the upgrading and subdivision of three large, light industrial premises, and I also inspected buildings and managed repairs.

Doing my own thing

After three years at JLL, and a short spell with my boss when he set up by himself, I started my own business. Building Consultancy Pty Ltd provided building surveying advice to commercial property funds and owners.

Until that time in the mid- to late 1980s, there were few practising chartered building surveyors in Sydney. The surveying requirements for commercial and industrial pre-purchase inspections were rudimentary – buildings were inspected and reports prepared, but there was little checking of services and no consideration of environmental issues.

Working closely with Schroders, a professional property fund, we developed an inspection process that included assessing a building’s services as well as its fabric and regulatory compliance.

Then the Australian Corporate Law Reform Act 1992 required that: “An officer of a corporation shall at all times exercise a reasonable degree of care and diligence in the exercise of his or her powers and the discharge of his or her duties.” Technical due diligence inspection in Australia was born.

After 18 years, my firm was acquired by CBRE; by then, I and two other directors employed 10 people.

Experienced and green

I stayed with CBRE for three years but longed to be independent again and work with like-minded clients on projects where I could use my broad commercial building consultancy and management expertise and follow my growing passion for sustainability in the built environment.

The profession’s own burgeoning interest in this area was marked by the advent of energy ratings, the rise of the green building movement and the establishment of the Green Building Council of Australia (GBCA).

Throughout the years, I have been an active committee member of the RICS in Sydney, and in 2006 I ended up chairing the organisation’s newly formed Sustainability Group for Oceania. We gave presentations, wrote guides and have been promoting better standards for sustainability in commercial property ever since.

Our sustainability guidance includes:

- Choosing and Managing and Energy Efficient Space: A Best Practice Guide for SME Commercial Office Tenants
- Guide to Environmental Performance Clauses: Commercial Property Leases, Australia
- Sustainability and the valuation of commercial property (Australia)
- Greening Make Good Australia (which covers the reduction of material wastage at lease end)
- Green roofs and walls guidance note.

While at CBRE, I also worked closely with the City of Sydney’s and WWF’s representatives on the first ever Earth Hour, which began in Sydney in 2007 with the idea of encouraging people to turn off lights in all buildings for 60 minutes on a particular night of the year. Surprisingly, until that time building owners did not have the controls to turn off their lights, so we aimed to encourage them and their tenants to install systems for doing so.

Alongside Earth Hour, the introduction of the National Australian Built Environment Rating System – which requires mandatory disclosure of a commercial building’s energy ratings in advertising when the space transacted is more than 2,000 sq. m – the formation of the GBCA and fiercer competition between property funds saw an increase energy efficiency in commercial properties. Property funds even began to publish the efficiencies of their portfolios; currently, Australian funds are among the highest ranked of the world’s most sustainable property funds (http://bit.ly/2cBxmUS).

Warm welcome

A chartered building surveyor’s skills travel well to Australia. The business culture is broadly similar, as are the language is broadly similar, as are the qualifications. There are many chartered surveyors here – both locals and those from the UK – making newcomers feel at home from the start.

RICS has a well-established network in Australia with offices in the major cities, all of which are staffed by friendly people who run training, professional
development and social events, so making local connections is not difficult. Many people you meet will have made the same journey and so come across the same issues.

The challenges of working in Sydney lie more in the traditional areas of chartered surveying; there are always challenges, but none of them are particularly related to working in Australia.

**Dilapidations differences**

However, the area of dilapidations in Australia sometimes still resembles the Wild West. RICS has produced local guides on this and also runs training, but many building owners and their managers think that they can achieve whatever they write in their lease – ignorant of or deliberately overlooking laws in New South Wales, Queensland and the Northern Territory that restrict the owner’s ability to claim to their loss in reversionary value, as in UK law.

Ill-informed and forceful building owners and managers can and do bamboozle tenants into paying far too much when they are threatened with holding over and not repairing dilapidations to their ‘standards’. In Victoria, Western Australia, Tasmania, South Australia and Australian Capital Territory, the wording in the lease is taken at face value.

Project management works similarly to the way it does in the UK, as does contracting; but construction detailing and terminology can be quite different, as the following questions demonstrate.

- **Which is the warm side of the insulation?** In the UK it is the interior, but in many parts of Australia it can be the exterior. Vapour barrier detailing needs to be carefully considered, and if in doubt, the insulation should be protected from both sides.

- **What are ant caps?** These are galvanised steel-plate caps fixed to the tops of brick piers that prevent termites from travelling up through the centre of the pier, forcing them to build their galleries in the open air.

- **Why are more roof screws required in tropical areas?** High winds and cyclones in the tropics mean that roofs need to be extra secure.

- **Why are the gutters in buildings and pavements so big, especially in Sydney and further north?** Rainfall of 150mm per half hour and 800mm per day is not uncommon, and drainage needs to be designed to cope.

- **What is the effect from thermal shrinkage when a southerly buster drops the temperature from 40°C to 15°C in half an hour?** When shrinkage can be about 16mm, large roofs and facades need careful detailing.

- **What is a GPO?** This is a general purpose outlet or power socket.

Titles and descriptions also differ:

- **building surveyors** in Australia are registered private certifiers of building code compliance, or work for councils as building compliance inspectors

- **a schedule of dilapidations** is widely used to describe the condition of premises, whereas UK surveyors would call this a **schedule of condition**.

But as well as these differences, the sheer variety of projects in Australia is fascinating, as the range of my current workload shows:

- **project managing an office warehouse extension**

- **waterproofing the roof of an iconic 1950s office building**

- **upgrading of a natural heat rejection system**

- **making good and building inspection works**

**Making myself at home**

When you are no longer so conscious of these differences, you can call the place you have moved to your home. For me, this moment probably came when I was flying back into Sydney and I saw the setting sun shining on the Opera House and the Harbour Bridge.

I was pleased to be back after a tough few days inspecting a shopping centre in the middle of Queensland, far from the coast. It had been more than 40°C at midday, so roof inspections had to be carried out at 6am. I finally realised that Sydney was now my home.
All about Matrics

For the past 125 years, RICS Matrics has in its different forms been the platform for the next generation of surveyors. All students, trainees and members with less than 10 years’ experience after qualification are automatically Matrics members when they enrol with RICS.

There are 40 Matrics groups across the UK, meaning members are able to attend events near them and get to know fellow members and other professional groups in the area. If you attend a local group, you can enjoy interprofessional networking, social events, APC support, charity balls, sports and much more. I have made many contacts through such activities, a number of whom are now good friends.

The nature of RICS Matrics means that a number of members have just become chartered, or are APC doctors or assessors, and this allows them to support those working towards their APCCs. Matrics members are among the best people to engage and inspire the next generation, which is one of the organisation’s key objectives: since I have been involved, I have given numerous presentations, attended careers fairs at schools and universities and seen individuals come through this route who are now working towards chartered status, which is extremely rewarding.

RICS Matrics also lets members develop in ways that they would not necessarily be able to at work, fostering essential skills that can help young surveyors move into more senior roles. Matrics also provides a platform for new professionals to have a voice on RICS’ future strategies.

Matrics enables any aspiring RICS member to stand out from crowd. By being an active member, there is the opportunity to inspire the next generation and ensure that RICS continues to signify excellence for any professional in land, property and construction.

Amy Leader is the current RICS Matrics UK Chair.
Former military personnel have always been well equipped for the surveying profession, writes James Castle

From the services to surveying

With our minds much on the British armed forces 100 years on from the First World War, we should remember that some of those who fought went on to become surveyors. One such soldier was my grandfather, Charlie Watkins, who served as a company sergeant major with the Royal Engineers in the war and was mentioned in dispatches. I am fortunate to have a number of his war records, including his field book, which shows that he worked predominantly on railway infrastructure in Egypt, serving in what was known as the Middle Eastern theatre.

Charlie was born in Ellesmere, Shropshire, and in the early 20th century moved to Cheshire to marry. He arrived there as a joiner, but became a junior clerk of works before volunteering after the war broke out.

His military training included a period at the Longmoor army training camp in Shropshire before he progressed into the Royal Engineers. After leaving the army at the end of the war, he returned to his studies and eventually qualified as a surveyor with the Incorporated Association of Architects and Surveyors, which is now the Chartered Institute of Building. He went on to become the chief surveyor for a rural district council, which in those days would have had as much responsibility as today’s metropolitan district councils.

Retraining today

A hundred years later, it should be a lot easier to achieve what Charlie Watkins did. Accessible universities provide RICS-accredited degrees, and often have links with professional practices and boards. There are also funding sources such as the Enhanced Learning Credit Administration System and a Ministry of Defence scheme.

Yet the transition from military to civilian life can be problematic. It may be difficult to believe, but former service personnel can lack confidence. Many leaving the military do not appreciate their own abilities and are too modest about their achievements and potential. So while it should be easier now for ex-soldiers to become chartered surveyors, there are still issues.

Fortunately, these can be overcome through retraining. In 2013, members of HM Forces, Glasgow Caledonian University (GCU), Glasgow’s Helping Heroes charity and local further education colleges set up the GCU HM Forces Learning Partnership (www.gcu.ac.uk/hmforces/). Its primary aim is to take ex-service personnel and help them maximise their potential for skilled permanent employment through further and higher education.

This holistic approach is important. Not everyone leaving the army is a commissioned officer with 20 years of experience and qualifications; there are also those from the other extreme, such as the private soldier who perhaps left school without many qualifications and, after two years of army life, decided to leave. While they would probably not be able to walk straight into a university, with the help of the partnership they can still start on the pathway to becoming a chartered surveyor.

Beginning with a college access course, they could move through national certificates to a Higher National Certificate or Diploma. Assuming they achieve a sufficient grade, they would be in a position to access GCU through the Learning Partnership and could subsequently take the RICS-accredited BSc (Hons) Building Surveying.

Following graduation, they could then complete the RICS APC and other requirements, ultimately becoming a chartered building surveyor.

Military value

Thinking about Charlie Watkins again, was he typical in demonstrating the value of former servicepeople to the surveying profession? He was certainly driven, committed, prepared to work hard and willing to be a lifelong learner.

While he made the transition into surveying a century ago, some things have not changed. His attributes are typical of someone who has served with HM Forces – attributes that also provide excellent grounding for an aspiring chartered surveyor.

Many former Royal Engineers, and indeed those from other regiments and services, are current and past students and offer excellent examples of what can be achieved in the profession with military experience.

The transferable skills and personal qualities of former servicepeople – data collection, situation assessment, risk analysis, team spirit, personal responsibility, commitment and punctuality – are all eminently suitable for the profession, and as surveyors we should take advantage of this excellent resource. The partnership offers a suitable mechanism to do so.

James Castle is Programme Leader for the BSc (Hons) Building Surveying course at GCU and Chairman of GCU HM Forces Learning Partnership. He is also Vice-Chairman of the Glasgow area Military Education Committee and serves on the UK-wide Council of Military Education Committees.

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Peter Defoe reviews rights of light developments subsequent to the recent RICS guidance note

Casting fresh light

It would appear that no sooner had the RICS published the second edition of its Rights of Light guidance note last March (www.rics.org/rightsoflight) than a key piece of legislation was amended to affect the ability of a local authority to appropriate land for planning purposes, thus preventing the grant of an injunction for loss of daylight. A recent appeal case, however, reinforces the need to deal properly with concerns about loss of light.

Act gains assent
In May last year, the Housing and Planning Act 2016 received Royal Assent (see Building Surveying Journal October/November 2016, p.16). Section 203 now provides that a person may carry out building or maintenance work even where this involves interfering with a relevant right or interest, or breaching of a restriction as to the use of land that arises by virtue of a contract.

They may do so on the condition that there is planning consent for the building or maintenance work; the work is carried out on land that has at any time on or after the day on which this section comes into force become vested in, or acquired by a specified body including statutory authorities, although to have this right they must have the necessary enabling powers in legislation; or the land has been appropriated by a local authority for planning purposes as defined by section 246(1) of the 1990 act.

Critically, to overcome a deficiency previously identified in section 237 a person may use land in a case to which section 246(1) or section 203 of the 2016 act applies even if the use involves interfering with a relevant right or interest, or breaching a restriction as to the use of land arising by virtue of a contract.

Where the land is currently owned by a specified authority, it is to be treated for the purposes of section 246(1) of the 1990 act or section 203 of the 2016 act as if it were not currently owned by that authority. The purpose of this is to treat the acquisition as though it were a compulsory purchase.

Section 204
Section 204 of the 2016 act deals with compensation for overridden easement. It states that the compensation is to be calculated on the same basis as compensation payable under sections 7 and 10 of the Compulsory Purchase Act 1965, and any dispute about this may be referred to and determined by the Upper Tribunal of the justice system.

This is no different to the method applied under section 237 but, as the guidance note points out, this method of extinguishment is complex and will often require specialist legal advice.

In fact, we have yet to see any cases where this approach has been taken. But if it works according to the wording of the legislation, then appropriation is likely to remove a great deal of uncertainty when seeking to eliminate the risk of injunction for rights of light injury. Nonetheless, the authorities may still be required to demonstrate that they have attempted to settle any claim by negotiation.

Case for concern
Ottercroft Ltd v Scandia Care Ltd (1) and Dr Mehrdad Rahimian (2) was heard originally in Oxford County Court in January 2015. It has since been heard in the Court of Appeal, which decided that the developer’s behaviour and breach of an undertaking not to interfere with its neighbour’s light outweighed the fact that the loss was relatively minor and capable of being compensated with a small payment; this is one of the principles established in Shelfer v City of London Electric Lighting Company [1895] 1 Ch 287.

Ottercroft involved the relatively common need to replace an existing wooden fire escape staircase with a metal one. Ottercroft
owned the restaurant that neighboured Scandia’s property and complained that the new staircase obscured its kitchen; it sought an injunction requiring the removal of the staircase. While Scandia accepted that the neighbour’s right to light was infringed, it argued that an injunction was not the appropriate remedy.

It was stated that the value of the loss of light was £886 as compared with the cost of relocating the staircase, which was stated to be around £6,000. Usually, a loss that could be compensated by £886 would be considered no greater than minor, and commercially speaking we would expect to be able to settle even if a higher sum needed to be paid to reach that settlement. However, in this case Oxford County Court and subsequently the Court of Appeal decided to take account of the conduct of the parties.

It was found that Rahimian, a director at Scandia, had acted in an un-neighbourly manner from the beginning. He apparently knew that the staircase would infringe Ottercroft’s right to light but still proceeded to put it up, even when threatened with legal proceedings.

Then, despite undertakings given by Scandia and Rahimian to the contrary, they continued to construct the staircase at a time when they knew the neighbouring premises would be vacant and did not inform Ottercroft. Taking all of this into account, the county court judge granted an injunction.

It was perhaps inevitable that Scandia and Rahimian decided to appeal, arguing that the judge had not acted proportionately and that his decision was based on unfounded assumptions. The Court of Appeal concluded that the new staircase did infringe Ottercroft’s right to light; there was evidence that it was feasible to move the staircase, albeit at a cost of around £6,000, and the judge was entitled to consider Scandia’s and Rahimian’s conduct in the round and was not wrong to exercise his discretion on the basis of such conduct.

The court found that Scandia and Rahimian had acted in a high-handed manner and had tried to steal a march on Ottercroft. In so finding, it decided that an injunction was necessary not only to do justice to Ottercroft but also to serve as a warning to others. The appeal was unanimously dismissed and the injunction was upheld. This decision very much supports the one in Coventry & Ors v Lawrence & Anor (No 2) [2014] UKSC 46 (23 July 2014) and emphasises the need to be completely open and honest when dealing with adjoining owners.

Ottercroft Limited v Scandia Care Limited and Dr Mehrdad Rahimian (B2/2015/1149) was heard by the Court of Appeal on 6 July 2016, and recently reported.

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Related competencies include Legal/regulatory compliance

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Client care is a mandatory competency for building surveying, and Ewan Craig, a speaker at the RICS annual It’s Your APC conference, offers guidance.

Taking care of business

Client care should rightly influence all areas of the construction sector, and will be especially evident in building surveying practice. It is integral to good business practice when providing technical services; adopting a winning approach to client care results in a high level of repeat business.

Examples in the technical competencies include the following.

- **Building pathology**: such as identifying who the client, end user and stakeholders are when dealing with a defect in a housing association dwelling, and how best to manage the relationship with them.
- **Conservation and restoration**: such as identifying who the client, end users and stakeholders are when dealing with the multistage refurbishment of a heritage property in which several supporting grant bodies and amenity societies are involved.

The levels

The requirements for this competency by level are as follows.

**At Level 1**
Demonstrate knowledge and understanding of the principles and practice of client care, including:

- the concept of identifying all parties who are your clients and the behaviours that are appropriate to establish good relationships with them
- the systems and procedures that are appropriate for managing client care, including complaints
- the requirement to collect data, analyse and define the needs of clients.

**At Level 2**
Provide evidence of practical application of the principles and practice of client care in your field.

**At Level 3**
Provide evidence of reasoned advice given to clients and others.

You should be familiar with the client care issues in your submission documents, and be ready to address questions on them and related matters.

**Questions**

Actual questions are based on the candidate’s experience, which should be at Level 2 but could exceed this. Two examples are given below.

**Can you explain your approach to client care at the commencement and during the investigation of damp at housing estate X?**

This question is aimed at Level 2 candidates. The answer should explain pertinent issues to support your application of knowledge.

The client, a large housing association, instructed my practice to investigate dwellings that were each suffering similar damp issues. The practice had carried out similar services previously and a partner was already allocated to look after the client’s overall care. I had not worked for this client before and I confirmed with the partner the approach to be taken. I then confirmed with the client their points of contact, preferred lines of communication, priorities and constraints, as well as our scope of services, reporting and deadlines.

The client worked with me to find a strategy to investigate the damp, and reduce potential disruption to residents by initially assessing three void properties. I reported the findings to the client and they agreed to further investigation on a larger sample of occupied houses using targeted techniques and non-destructive testing to minimise disruption while gaining data to assess the likely cause.

My final report resulted in work to remedy cavity walls and solid floors defects affecting the estate. I updated the client regularly on progress and cost, by telephone and email, meeting them at planned points and providing reports. I also worked with tenant representatives and with the tenant group so they were aware of the work.

**Please tell me how you gained feedback on client care in your investigation of the latent defects to building Y.**

This is aimed at Level 2 candidates as well. Your response should show the issues that were considered in applying your knowledge.

My practice has a formal process of interviewing clients and gaining feedback using a standard questionnaire at the end of a project. I interviewed the primary client contact on client care. They were open and candid, giving a useful insight into their perspective on what went well, such as our regular email updates on progress and my interim reports when deadlines had been brought forwards.

They also suggested areas that could be improved, such as a shorter lead time in commencing the project. The questionnaire results were compared with similar projects and clients – at both team and firm level – to identify good practice as well as areas to improve. Feedback was given to the client on what we had done to improve our service.

**Care**

Given the time constraints of the APC, your answer should be brief but comprehensive. Care should be taken to demonstrate your own skills, abilities and knowledge to the assessors.

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For details on the APC pathway guide for building surveyors, please visit http://bit.ly/1qBVuhw
Cultural heritage is hard to categorise neatly. A building may have an historic interior, but heritage may also lie buried underneath it or in the surrounding landscape as archaeology. Among the members of the Institute of Conservation (Icon) are conservators who cover all aspects of heritage. Conservators and conservation surveyors need to share an understanding of conservation philosophy and the standards that are distinctive to each profession’s practice.

With better understanding, we can make informed, competent decisions, working effectively while educating clients and public about the value of what we do.

**Standard definition**

One particular complexity is what defines a “heritage professional” when this covers conservators, surveyors, archaeologists, architects, engineers and conservation officers. To enable mutual understanding, Historic England recently commissioned a comparison of accreditation and membership schemes for UK heritage professions. Although not yet publicly available, its table of comparison will form the basis for defining what constitutes a “suitably qualified professional”. Heritage bodies will then be able to promote each other’s accreditation and professional standards.

After many years of work by professional bodies and key clients to harmonise accreditation in the sector, there is a great deal of commonality between our schemes. However, this is not evident to our client groups: at least, that is the message from recent research commissioned by the Historic Environment Forum of England, which sought a better understanding of how the “qualified heritage professional” is perceived.

The research is due to be published this spring, but we know from interim reports that we have much to do to make it easier to access information, convince clients of the value of commissioning an appropriately qualified person, and demystify the different heritage sector accreditation schemes.

Such collaborative efforts are essential if the heritage sector is to respond to the challenges that lie ahead.

**Creating links**

One such challenge is the planned increase in major infrastructure projects in the UK. More than 40 schemes are planned up to 2033, at an estimated total capital cost of £464.9bn. There will also be a need to fill skills gaps – with an estimated capacity shortfall of 880–1,900 full-time staff per year from 2016 to 2020 in the archaeological sector alone, for instance.

The £7bn refurbishment of the Houses of Parliament is due to start in 2020 and will also require qualified professionals and trainees, as will the £379m refit of Buckingham Palace.

All these projects offer major opportunities to advocate our professional standards, offer new routes into the sector through training and higher education, and recruit and retain appropriately qualified professionals.

Collaboration will enable significant benefits. Relative newcomers such as Icon can learn from more established bodies such as RICS. As we face unprecedented demands, our voices can together influence the market to meet the highest standards of heritage conservation.
Peter Carey explains how a conservation management plan was integral to the restoration of the Theatre Royal, Bristol Old Vic complex

Conservation management plans (CMPs) have become integral to the heritage sector. They are predicated on the notion that defining heritage's value and assessing its significance will help to ensure any decisions that could affect those values are made objectively; but they are not primarily designed to respond to particular proposals. Since CMPs were introduced in the UK in 1996, there has been considerable variation in scope, quality and effectiveness, though.

Conservation context
Conservation plans were originally developed in Australia around 1982 in response to the Burra Charter, the document listing basic principles and procedures when Australian heritage sites or buildings undergo conservation. Since their widespread adoption in the UK by the Heritage Lottery Fund as an essential accompaniment to grant funding applications in 1996, they gained still wider support.

The scope, quality and effectiveness of these plans have sometimes veered on the exhaustive, leading to the development of lighter alternatives such as the conservation statement (CS). But both the CMP and CS are significance-based documents; the more onerous CMP requires the planning of specific actions, whereas the CS affords more rapid assessment of heritage value, often in response to a specific proposal or opportunity, but without a prescription for future action. Both documents are intended to help with design development and decision-making.

In contrast, heritage statements accompany planning or grant applications for specific development projects. One-off reports on the conservation strategy adopted in response to the CMP or CS, such statements discuss the impact of specific actions on the significance and heritage value.

Complex case study
To look at the way CMPS work in practice, we can consider the restoration of Bristol Old Vic’s Theatre Royal.

The Theatre Royal is so-named as the original theatre of 1766 received a Royal Licence in 1775; the Bristol Old Vic is the name of the production company that took up residency in the theatre after the Second World War. In 1969, the Georgian building Coopers’ Hall was gifted to the Theatre Royal Trust by Bristol City Council; the theatre and production company trusts have since merged.

Donald Insall Associates has been involved with the conservation of the Theatre Royal for more than 15 years. When we commenced work, we discovered that the theatre’s archives were located at least four places:
1. in the Bristol city archive in B Bond Warehouse, which is well catalogued
2. in the College Green public reference library as part of city-wide archives, which are generally well catalogued
3. in Bristol University’s Theatre Collection, which also includes the archive of theatre historian Kathleen Barker as well as playbills and other memorabilia; this collection is only partially catalogued
4. in boxes of files and other papers around the theatre itself, with even less cataloguing or organisation; one recent major grant allocation is for a joint initiative with the University of Bristol to sort and catalogue this material properly.

The sifting, collecting and collating of these diverse sources informed our understanding of the narrative of the theatre and its history. As a result, the bibliography and reference section in our CMP identifies the locations of these sources for any future investigation.

One of the primary problems with the building had been that the accumulation of changes and new elements over time represented different intentions and were of differing quality. The whole site – including, the Georgian theatre and the Coopers’ Hall’s remains, together with the
20th-century alterations – was relisted as a grade I listed building in 2000.

The original stage house and ancillary buildings, such as the paint shop and scenery dock, along with the whole King Street front of house and façade and the complete interior of the Coopers’ Hall, were demolished in the late 1960s, leaving merely the shell of the hall and the auditorium with its roof intact. But these controversial elements of the scheme by theatre architect Peter Moro were justified, because it was seen as necessary to keep the theatre alive as a highly significant work by a prize-winning architect of the day.

Would such a scheme have been allowed today? It is highly unlikely. However, it was a different era, with a different cultural ethos, a different approach to theatre and, certainly, a differing view of the value of heritage.

Our extensive documentary research exposed a surprising dearth of hard evidence about the interior or exterior of the early theatre, which meant that focused, primary research and investigation was needed before pursuing further alteration and improvement works projects.

The CMP was used extensively as a reference document in the run-up to the auditorium works. Since then, the plan has been revised and updated in anticipation of the so-called “Anniversary Works”, which aim to remodel the front of house completely.

The process

One of the key elements identified early on was the need to provide accessible documentation that would be user-friendly despite being extensive and relatively exhaustive. The initial plan was to subdivide this into three volumes:

1. the general text: from the introduction to policies
2. illustrations maps, plans and photos
3. the gazetteer: the room-by-room reference, which serves as the primary record of value by element and location.

This three-volume format allows for more manageable content while enabling necessary revision and updating as and when further change occurs.

The problems

Many of the existing sources proved misleading, if not plain wrong.

For instance, there were no illustrations of the theatre’s interior or stage before 1900. As this is the oldest surviving auditorium in the UK, which has been in near continuous use, insight into the development of theatrical styles over this period should not be better. But to gain such insight in the absence of a visual record, we have had to rely on documentary evidence, such as old playbills – that is, programmes – and newspaper records, which can often be inaccurate or exaggerate for effect. Other physical evidence on site can often be misleading or subject to misinterpretation.

It would be logical to report our findings from understanding through significance to policy, but the format would have meant the substance of the document was buried at the end. It was thought that if the order were reversed – starting with the conclusions and proceeding to the justifications – this might make it more useful as a guidance tool.

Major discoveries

The most satisfactory outcomes of the initial CMP were the findings of the investigation period it recommended before auditorium refurbishment. Considering that it is the only major 18th-century theatre auditorium still working as such in the UK, its history, particularly that of its early life, is of inestimable value. The research was able to overturn the following misconceptions.

1. The primary auditorium structure had been assumed to derive from 1800, with the addition of the gallery level. It was assumed that the creation of this upper-floor gallery had resulted in a significant replacement of original structure. But we were able to prove beyond doubt that the structure we see, particularly the storey-height posts, all dated from 1766.

2. The painted dress circle fronts of 1832 were supposed to be the sum total of the earliest decoration that survived. However, we were able to demonstrate that the remains of the 1766 interior decoration survived behind these painted canvas fronts.

It was commonly accepted that there had originally been boxes at stage level, which implied a proscenium door further upstage where indeed a door or doorway had appeared from available 20th-century visual records. But there should have been a third pilaster upstage again, as could be seen by comparing the structure to a sectional drawing of the London’s Theatre Royal Drury Lane attributed to Sir Christopher Wren.

We were able to prove categorically that there was no such original stage-level box: the cut joist-ends of the original forestage linked with the current stage-box floor, all on a rake, indicating proscenium door entries, and the Garrick box – named for David Garrick, the leading actor of the Georgian period – indicated on the early booking plans was at first-floor level.

During investigations, we were also confidently told that nothing remained under the pit floor following Moro’s creation of the new stage. However, we
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were delighted to discover original flags from the stage subfloor, some timber floor plates to the orchestra pit and two sets of stone access stairs either side of the pit.

3. Access to the side upper circle was never totally clear, but we found proof of original side-stair access, confirming also evidence for the gallery originally being at that level.

The creation of the new gallery above the old one, which became the central upper circle had always been a mystery. The thought of the additional structure required to convert a ceiling into a full load-bearing floor suggested little should remain of the original structure. However, the central upper circle ceiling is the original gallery ceiling retained intact. The shaped side partitions are the original full-height gallery partitions, simply cut down at that time.

4. Not only did we discover the paint silhouettes of original bench ends throughout, but a box partition also remained, as did various seat parts and supporting elements, both in the central current gallery. This would have been installed in 1800, with the upper circle in place by 1766.

The CMP helped to redefine the relative heritage value of individual parts when classified together under the grade I listing. As it could only be based on existing scholarship, further primary research and investigation were identified as being necessary.

Work specifically looking into the auditorium provides the focus for the next phase of conservation. The results of this investigation have been highly significant in correcting some of the inherited misconceptions and have contributed significantly to improved comprehension of this unique historical jewel.

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Breathing space

Adam Brown explains the different types of breathable paints and evaluates their usefulness as a long-term response to damp

Water will always be present in buildings, so managing moisture is key: if water is allowed to accumulate, it can lead to issues such as damp or, in the worst case, structural failure. When it comes to renovating and decorating older buildings, breathable mortars such as lime have been proven to help manage moisture.

But what about paint coatings? And how do we define what makes a “breathable paint”?

Vapour-permeable paint
We class “breathable paint” as a coating that can allow the transfer of water vapour. The premise is to allow water to evaporate from the surface, preventing it from accumulating in the building fabric.

There is no defined European standard for breathability, and consequently several ways currently exist to measure this quality. Until the conservation profession researches, presents and adopts a standard, this will continue to be an issue. A large number of paints on the market today claim to be breathable; however the measurement for breathability is taken against standards that are not specific to paint and cannot readily be compared. In the mean time, stream diffusion (SD) value or air layer equivalence – a German standard that measures the resistance of a paint coating and its ability to allow moisture to pass through – is the most commonly used method. The lower the SD value, the more vapour-permeable is the paint.

A breathable paint should have an SD value ranging from 0.01m to 0.5m – equivalent to moisture having to travel between 1cm and 50cm through static air to pass through the paint – meaning the coating has minimal resistance and vapour can pass freely without being slowed or stopped. Conventional masonry paints will likely have an SD value of 1 or more, equivalent to moisture having to travel 1m through the air, making transfer very difficult if not impossible.

When we call these paints “breathable”, we are actually thinking about their permeability for vapour. In specifying or using a vapour-permeable coating, it is important to look for the SD value; every paint manufacturer should be aware of this figure.

Absorbing action
The most appropriate paint for historic fabric is one that has a low SD value – but bear in mind that absorption of a paint can also be a critical element in performance, especially for external decoration. Capillary action can force water into the fabric much more quickly than the permeable coating can expel the moisture, which can result in saturation.
Again, there is no standard definition for water absorption in paint coatings, but W24 value is a measurement of how many kilograms of liquid water a paint coating will absorb per square metre over a 24-hour period (kg/sq. m/day). The lower the value, the less water can enter the fabric. If a coating is vapour-permeable, it will inevitably absorb some water; the rate that is acceptable will depend on the specific circumstances. Should the coating be applied to an exposed wall that is subject to wind-driven rains, then a low W24 value is required; if applied to a sheltered wall that is not subject to adverse weather, a low value is not so critical.

Suitability for historic buildings
Older buildings, usually meaning those built before 1919, are often fairly simple in terms of their construction, generally comprising thick, solid walls with no cavity, a feature that was introduced in the 1920s.

The result is that moisture will always be present in some form in the building fabric. The original coating materials, such as mortars and paints, were softer than the materials that they covered – for example, stone or brick – and thus allowed moisture to escape.

Modern construction has developed ways to manage moisture through the use of cavities and vapour-control layers. However, older buildings do not have the same provision, and rely on the fabric itself to control and enable moisture movement.

Damp is thus common in older buildings. Unfortunately, in some cases it is still thought that the only way to eradicate this issue is to waterproof the entire building with a coating such as masonry paint, or by injecting damp-proof courses to stop water penetrating the building. While this offers a temporary solution, it is never the answer, and the majority of these applications on historic buildings fail.

One of the main reasons for this failure is that a building can undergo significant movement during its lifetime, both structurally and thermally. Once a crack appears, water can penetrate the structure and remain in the wall behind the coating. A secondary issue with cracking is during the winter or colder months: as water becomes ice, it has an expansion rate of roughly 9% each time it freezes. As this freeze–thaw cycle is repeated at given temperatures, cracks widen, albeit at an irregular rate depending on their depth, pattern and the volume of water they contain.

Because water is usually driven into cracks by rain and wind, it evaporates into moisture under the dryer conditions present within the wall. Moisture then moves inside the wall, and though small amounts may escape back through the cracks, most of it will be unable to pass through the film formed by paint coatings, and it will thus work its way back inside the wall. Modern paints such as emulsions and masonry paints are classified as “film-forming” in this way because the chemicals they contain create a plastic-like layer enabling them to adhere to the surface of a wall or ceiling.

A build-up of moisture can cause blistering and bubbling of the paint where the water is trying to escape (see image, above right) and is referred to as hydraulic pressure. In more serious cases, the render may be blown – that is, forced off by the pressure of the trapped water. If accumulated water does not blow the coating, it can transfer internally, leading to issues such as damp.

Types of breathable paint
Vapour-permeable paints can come in many forms, with the most common discussed below.

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<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td>Easy to use</td>
<td>Labour-intensive application, requiring numerous coats</td>
</tr>
<tr>
<td>Economical to produce or purchase</td>
<td>Poor durability, especially when used externally</td>
</tr>
<tr>
<td>Historic precedent</td>
<td>Needs constant maintenance</td>
</tr>
<tr>
<td>Consolidates friable materials</td>
<td>Constant repainting can be costly</td>
</tr>
<tr>
<td>Vapour-permeable</td>
<td>Can only be applied to porous surfaces</td>
</tr>
</tbody>
</table>
superior durability – fewer coats needed to be applied, but it had to be used immediately after preparation.

**Tallow limewash**

Various additions were made to limewash to offer improved characteristics, such as workability and durability.

Animal fat was added to improve resistance to weathering. The tallow helped to prevent water ingress, but unfortunately reduced the vapour-permeability of the coating. Linseed oil was an additive similar to tallow that gave the same results.

While there is no defined addition rate for these materials, it has been found that 10% or less will not have too drastic an effect on vapour-permeability.

**Distempers**

These coatings commonly do not use lime as a binder, instead containing chalk as a filler and pigment and a glue as the binder.

Distempers were simple to produce, vapour-permeable and resistant to alkali, so could be painted over lime plaster relatively easily. The glue binder meant that they could be used on any surface – unlike limewash, which can only be applied to porous surfaces. The qualities of distempers are summarised in Table 2.

**Mineral silicate paints**

These were developed at the end of the 19th century. As with limewash, they soak into the surface and bond to it; where they differ is that limewash generally bonds to the calcium in the surface whereas mineral paints form a strong chemical bond with the silica in the substrate.

It is well known what a strong, stable mineral silica is. Widely used in building, the paint’s bond makes them far more durable than limewash or distempers, with examples surviving for more than 100 years in Germany and Switzerland. Admittedly, these are far more favourable climates than the UK, although there are examples in this country of mineral paints surpassing 15 years, which is longer than film-forming paints last.

Mineral paints are available in many forms, for both internal and external use. Some offer a full chemical bond with the surface and others a passive bond where the paint can be removed. A sign of the former is that it cannot be removed with a paint stripper.

One drawback to mineral paints is that, as a result of this durable chemical bond, they are very difficult to remove from the surface. As they are bound to the surface, they will hold a consistent colour, whereas a limewash has the tendency to change, although some find that change attractive.

The features of mineral paints are set out in Table 3.

**Protective priority**

When dealing with historic buildings, understanding paint performance is vital. It is often the last thing considered during a project, but is the first thing everyone sees. Paint fundamentally serves as a protective coating, offering decoration as a secondary benefit; it has to be viewed this way.

Performance data is always vital when looking for suitable paints, and SD and W24 values are the simplest way to quantify the level of performance required. Sensitivity to the type of building being conserved or restored is also critical: for example, I would never advocate the use of a mineral paint on an ancient monument. For the majority of buildings, however, such paints will offer the client a durable and cost-effective coating.

Each building is unique and has to be treated as such. If the paint is to be applied externally, absorption also has to be taken into consideration. Durability and longevity can also affect both long-term performance and cost. If a suitable paint offers a higher durability but is more expensive, it can still offer a more cost-effective option in the long run.

---

**Table 2**

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to use</td>
<td>Poor durability</td>
</tr>
<tr>
<td>Vapour-permeable, when not oil-bound</td>
<td>Modern distempers are expensive to purchase</td>
</tr>
<tr>
<td>Can be applied to numerous different surfaces</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3**

<table>
<thead>
<tr>
<th>Advantages and disadvantages of mineral paints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages</strong></td>
</tr>
<tr>
<td>Unsurpassed durability</td>
</tr>
<tr>
<td>Long-term protection of the fabric</td>
</tr>
<tr>
<td>High vapour-permeability and low absorption</td>
</tr>
<tr>
<td>Very low maintenance</td>
</tr>
<tr>
<td><strong>Disadvantages</strong></td>
</tr>
<tr>
<td>Initial material cost can be high</td>
</tr>
<tr>
<td>Can be difficult to remove</td>
</tr>
<tr>
<td>Lack of historical precedent when compared to limewash</td>
</tr>
</tbody>
</table>

**Adam Brown** is a building surveyor at the Cornish Lime Company
adam@cornishlime.co.uk
The Department for Business, Energy & Industrial Strategy is proposing to revise the Standard Assessment Procedure (SAP) for solid walls. The recent consultation on revisions suggests reducing the U-value to 1.7W/m²K from the current 2.1W/m²K. Research in recent years has shown that U-values measured in situ are lower than previously thought. The Sustainable Traditional Buildings Alliance says the recommended 1.7W/m²K level is still slightly higher than indicated by recent reports from University College London and BRE, but it would still be a very welcome change for several reasons:

- savings from solid-wall insulation have been overestimated, so government policy on retrofitting would enable focus on more cost-effective measures as part of a whole-building approach
- SAP scores for traditional buildings will improve, and this may have an impact on their energy performance certificate (EPC) ratings
- under the Minimum Energy Efficiency Standards, it will be illegal to let out private properties with an EPC rating lower than E from 2018.

Consultation on the proposals closed at the end of January.

Heritage Counts 2016

The Historic Environment Forum and Historic England have published their annual report on the heritage sector in England, *Heritage Counts*. One important new stream of data is on heritage and the economy. Among its findings are:

- heritage generated £10bn in gross value added in 2013; if indirect and induced effects are considered, this number is £21.7bn, which equates to 2% of the national total value added
- in 2013, there were 164,100 jobs in heritage employment; the figure rises to 328,700 if indirect and induced heritage employment is added, which equates to 1% of total national employment
- domestic and international tourism generated £18.4bn of expenditure in England in 2014, supporting 285,000 jobs; heritage tourism accounted for 22% of all tourist spending in that year
- statistics from the Heritage Lottery Fund from 2010 indicate that, for every pound spent on a heritage visit, 32p is spent on site and the remaining 68p is spent in local restaurants, cafés, hotels or shops
- in 2015, UNESCO estimated that the financial benefit of World Heritage Sites in the UK was £85m per year, as the brand is a strong marketing tool.

Interestingly, heritage tourism is more popular in England than in most of Europe. UK citizens have the fourth highest visit rate to historic monuments or archaeological sites, at 65% in 2016. According to Visit England, the four most visited paid attractions in England are the Tower of London (2.8m visitors), Westminster Abbey (1.7m), Kew Gardens (1.6m) and St Paul’s Cathedral (1.6m).

Data from Colliers in 2011 shows that listed properties also generate a higher level of total return on investment, while the commercial property data source Investment Property Databank (IPD) Listed Property Index generated a higher level of total return than the wider IPD index for three-, five-, 10- and 30-year time periods.

The heritage indicators section of *Heritage Counts* offers some interesting statistics. The number of listed building consent applications as a proportion of all planning applications has increased from 5.7% in 2007/08 to 7.1% in 2015/16. There has also been a decline in the number of local authority conservation staff, which has dropped by 35% from 2006 to 2016. *Heritage Counts* also provides updates on the basic number of protected heritage assets, reporting that there are 376,577 listed buildings; 19,848 scheduled monuments; and around 10,000 conservation areas (as these are local authority designations, their numbers are estimated).

- https://historicengland.org.uk/research/heritage-counts/
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